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Grapevines growing under future RCP scenarios in Europe

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Abstract

Introduction: Viticulture is a climate sensitive crop since optimum growth requirements are generally restricted by atmospheric conditions. Given the projected climate change scenarios, grapevine growth may be further challenged in the future. Owing to the importance of the vitivinicultural sector in Europe, the assessment of future climatic impacts in viticulture is of utmost relevance for the winemaking sector.

Methods: This study was conducted using a 9-member ensemble of regional climate models under the International Panel on Climate Change 4.5 and 8.5 representative concentration pathways (RCPs) until 2050. To evaluate the current and future optimum condition for quality winemaking, the growing degree day is calculated over Europe at a very high spatial resolution (<1km). Changes in ensemble means are analysed and the climate signal is isolated for each future RCP.

Results: As expected, a significant warming is anticipated over Europe in both future scenarios, strengthened in RCP8.5. Over southern Europe, the projected warming is expected to have detrimental impacts on winegrape development and quality, requiring additional measures to deal with heat stress. Over central Europe, growing conditions are expected to change into warmer growing seasons, which may result in changes in wine typicity. Conversely, over northern Europe, the warmer climate may prove more suitable for winegrape growth, leading to a northward shift of the current optimum growth conditions for grapevines.

Discussion: Climate change is thus expected to impose new challenges for the European winemaking sector. Adaptation measures need to be adequately and timely planned in order to cope with climate change impacts on viticulture. Over the Mediterranean-like climatic regions, these measures may be required for the future suitability of this crop and adaptation to harsh environmental conditions. Over the Atlantic/Continental regions, despite the general increase in suitability, additional measures are also required to adapt to the new climatic conditions.

Keywords: Viticulture; Climate change; RCP; Europe; Growing degree-day

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